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Bee-Culture in Cottage Hives.

No. 8.

ROBBING.

This is so great an evil, so annoying and vexatious, that if it befalls the apiary of a novice, it may thoroughly dissipate his fond visions of pleasure and profit from bee-culture. It is hence important that he be instructed in advance how to detect it in its incipient stages. If discovered early, it can generally be stopped without difficulty; whereas, when it has reached an advanced stage, the ruin of the attacked colony is almost inevitable.

Every bee goes naturally and instinctively in search of honey, and strives to appropriate it wherever found. The sense of smell is highly developed in all workers, and this conducts them, in poor seasons, when flowers and forage are scarce, to the hives of other colonies than their own. Spring and fall are the seasons when robbing occurs or is to be apprehended; but it is folly to assert that only poor and impoverished colonies will engage in the nefarious business. On the contrary, strong and well-provided stocks are precisely those most disposed and most prompt to commit depredations when occasion offers. The bee-keeper should therefore be ever watchful, that he may at once interfere and check the evil at its origin; and to aid him we shall endeavor to describe the indications which should arouse his suspicion.

At first a few individuals are seen hovering on erratic wing in front of the hive, now timidly approaching the entrance, and anon retreating with swift evolution, and as speedily reappearing to renew their prying approaches. While thus engaged, their hinder legs are stretched out at full length rearward, very different from what is seen in the case of returning foragers belonging to the hive. The proboscis, too, is remarkably distended, and it would almost seem as if they designed therewith to transfix the vigilant guards at the entrance, as they rush towards them with a desperate dash forwards, though wheeling away again with a sudden whirl. If there be any crack or crevice

in the hive, they will sometimes take post there, and strive to work their way in; returning to the work, again and again, if driven away.

So long as only a few such explorers present themselves, their appearance need cause no alarm, though it should always excite suspicion. In spring and fall they are to be seen in almost every apiary when the weather is mild, and pasturage scarce. But when they come in large and increasing numbers, the affair becomes more serious; for if the attacked colony does not actively repel them and speedily drive them off, it is either very weak, or has lost its queen.

But at this stage more unmistakable evidence of robbing is usually furnished by the combats between the assailants and the defenders, for even queenless stocks will at first struggle bravely in self-defence, unless there be several entrances or openings by which the robbers can get access to the interior of the hive. But if unable to repulse the repeated and protracted assaults, and the robbers once gain admittance and succeed in carrying off a portion of the coveted spoil, they will rapidly increase in number, coming by troops and squadrons to the fray. The struggle becomes a general melee; the alighting-board is the scene of conflicts fierce and furious, while the dead and dying strew the ground.

Even at this stage, the attacked colony, if not queenless, and the mouth of the hive is not large, sometimes, though rarely, succeeds in repulsing the assailants. If it succumbs, the strife gradually ceases, and a continual stream of bees is seen entering and issuing from the hive. Those which leave have their stomach distended with honey, and generally crawl up the front of the hive or along the alighting-board before they take wing, and their flight is heavy and sluggish. If the hive be lifted, the bees will be found dispersed through its interior, natives and strangers intermingled, the cells torn open, and the combs bedaubed with honey; fragments of comb and dead bees lie on the bottom-board; and when finally the stores have been plundered and carried off, the victims join their conquerors, and accompany them to their home.

We have repeatedly witnessed this procedure in our own apiary, and between our own colonies, permitting the drama to be enacted from first to last, and convincing ourself that the colony assailed will defend itself so resolutely and pre severingly, that it is never overpowered if the attack is discovered early enough to permit the needed aid to be given.

It is likewise easy to ascertain, either in spring or fall, whether a colony is robbing. At the mouth of such a colony, an unusual crowd of workers is then seen congregated, and humming complacently in a sort of undertone. Other workers are busily passing in and out, and returning bees are kindly received and caressed.

The workers begin to fly unusually early in the morning, even in unfavorable weather, and continue to make their excursions till late in the dusk of evening. Few of the returning bees bring in pollen; and the hive increases remarkably in weight, though the latter alone is no sure indication of robbing, at a time when pasturage is very abundant, especially if the colony be very populous. But we are now speaking only of spring and fall, when such abundance is not to be looked for. At those periods, too, strong colonies will occasionally allow individual marauders to enter and appropriate honey. We have at times seen such entering a hive with a rush, and reissue with the speed of an arrow, without producing excitement among the inmates. But even maraudings may result in a regular and combined attack, if the bees are not early made aware that their stores are thus abstracted by the dashing and daring intruders.

We have so far sketched the indications of robbing as they usually present themselves in its incipency and progress, where the assault was gradual and slowly increasing. But we have also known instances where, while our bees were busily and undisturbedly at work, robbers in large number suddenly made their appearance, and simultaneously assaulted every hive in our apiary. This sometimes continued to be repeated for several days, and then gradually ceased.

The Baron of Berlepsch experienced the like, and neither of us could give any satisfactory explanation of the phenomenon. They appear, however, to be unusual occurrences, and the danger resulting from them is diminished by the fact that all the hives are simultaneously and violently attacked, and the inmates thus at once aroused to make vigorous resistance.

When bees are flying unusually brisk, it is sometimes difficult to determine whether robbing is taking place or not, for in hot weather, amid the burning rays of the sun, bees will at times hover about the mouth of their own hives in a manner so resembling the deportment of robbers that a novice may easily mistake them for such. But if no conflicts take place after he has aroused the attention of the bees by brushing them from the entrance with a feather, he may dismiss his fears as ungrounded.

We likewise are of opinion that where robbing occurs the fault is with the party that is robbed. For though it were true—which we

are not disposed to believe—that bees could be *educated* to become robbers, still populous colonies having young, vigorous, and fertile queens will invariably succeed in repelling attacks, if their hives are in proper condition, and they receive some seasonable aid.

But, before proceeding to state in what such aid should consist, we shall briefly advert to the inducements and causes which lead to robbing, and which it behooves every bee-keeper to avoid or remove.

1. Queenlessness is the chief cause of successful assaults, for the prying explorers speedily discover whether a colony is queenless or not; and aware that such a community is either weak or dispirited, an attack is immediately begun, the ultimate issue of which is never doubtful, if the owner do not interfere. *Weak* colonies, too, are in danger of being robbed because they do not efficiently guard the entrance of the hive in spring and fall, thus allowing a few explorers to make their way in, and a general assault then speedily follows.

2. Carelessness in feeding bees is another not unfrequent cause of robbing. This occurs when the feeding-box is so placed as to be accessible to the bees of other hives, or when warmed honey is fed, the odor of which attracts others from a distance, or when partially emptied combs are set out in an apiary for the use of the bees; or when honey is accidentally spilled near a hive; or when the troughs or plates used for feeding bees at night are negligently suffered to remain unremoved till late next morning. Here the evil result is attributable to mere carelessness or negligence; but when robbing is superinduced by stimulative feeding in the open air, the bee-keeper must attribute his loss solely to his own rashness and folly.

3. Injudicious pruning of stocks in the vicinity of the apiary on a warm day often leads to robbing, as not unfrequently honey is spilled on the ground, or the partially-deprived hive is besmeared therewith; or knives, plates, and empty combs are set out to be licked clean by the bees, and thus prove to be a source of attraction for those disposed to rob.

4. Large entrances or side-openings give ready admission to stranger bees in search of honey, and such hives are sometimes robbed of a large part of their stores, before their own inmates become aware of their loss. When pasturage is scarce, the entrance of a hive should not be more than an inch in length by half an inch in height, and all other side or bottom openings should be carefully closed.

To one or another of these causes almost any case of robbing can generally be traced; and hence it may be alleged with truth that the bee-keeper himself is at fault if he suffers loss. It is almost always in his power to obviate or remove the cause; and more especially should he seek never to permit a queenless colony to remain in his apiary, when no means of supplying its want are provided. Robbing commonly occurs in the warm days of spring and fall, when honey cannot be procured from its usual natural sources; and the apiary at such times demands from its owner daily careful supervision, that damage may be prevented; for if the incipient

attacks of robbers be detected, their evil designs may be readily frustrated.

The means or processes to be adopted to this end are the following:

1. If we perceive that individual workers enter and leave a hive without appearing to attract the attention of the inmates, the latter should be roused and excited by breathing into the entrance, or by running a feather into it, or by rubbing it with a branch or twig of nettles. They will then speedily detect the intruders and exclude them. This commonly suffices to prevent further attempts, if these occur at a time when pasturage abounds, provided the hive is not queenless. If it be queenless, it must at once be removed from the apiary, for it is far better to appropriate the contents of such a colony, than to waste time in repelling attacks.

2. If those means should not suffice, or the robbing have been discovered only at an advanced stage, the entrance or mouth of the hive should at once be masked. For this purpose make a mixture of potter's clay, chaff, and soot, forming a mass of about three inches diameter. Insert in the mouth of the hive a rod three-fourths of an inch in diameter, laying it on a level with the bottom-board. Then press the prepared mass of clay over it, so as to close the entrance of the hive, leaving only a passage-way through the channel under the clay when the rod is withdrawn, so contracted at its outlet as to admit only two bees to pass at a time. Provision is thus made for the ventilation of the hive, and by the changed appearance of matters the robbers will be deterred from entering.

If at evening the attacks have not ceased, or very sensibly diminished, the hive or hives should be carried into a cool chamber or cellar, and left to remain there till next day. Next morning place an empty hive resembling in shape and color the removed one on the stand of the latter. If the robbers return in force, they may be dispersed or driven off by smoke, and towards evening the removed hive may be replaced on its former stand. If the attack be renewed next day, the same procedure must be re-adopted; but assaults will rarely be renewed on the second day, unless the hive be queenless, when its re-establishment should not be attempted. By this means we have frequently baffled and defeated very violent and determined attacks. The robbers are greatly disconcerted by the blackened mass of clay, whilst the native bees seem not to regard it, but are enabled to defend themselves more successfully by means of the advantage secured to them.

Many bee-keepers recommend that the attacked colony should be transposed with the attacking one. But not unfrequently the latter cannot be discovered or is not accessible, and the process is not always efficient, at times doing injury instead of saving the colony. A much better plan is to arrange with the owner of the assailing colony to confine the bees on alternate days. If the former have a queen, and pasturage be not entirely wanting, the robbing colony will usually cease making hostile demonstrations in a week or ten days.

But how is the assailing colony to be discovered? Bestrew the departing robbers with meal or pulverized chalk, and have observers stationed at the neighboring apiaries to ascertain where the bees thus marked enter. Or catch a number of the robbers and confine them in a narrow-necked bottle. Carry them to a distance from your apiary, and liberate a few. After describing a few circles in the air, these will fly in a direct line to their hive. Following some distance in the course thus ascertained, liberate a few more, and watch in what direction they fly. Repeat this till the liberated bees either turn to one side or fly to the rear. Now repair to the nearest apiary in the quarter indicated, liberate a few more bees, and these will enter the hive to which they belong.

Worse than useless, nay, frequently highly injurious, is the plan adopted and recommended by some, of covering the robbed hive with a sheet, and using smoke in front of its stand to scare away the robbers. These, intent on aggressive acts, disregard the smoke, which serves the more effectually to annoy the bees at home there; and both parties thus acquiring the same odor from common exposure to the smoke, the assailants are no longer betrayed by the peculiar odor derived from their own hive, and are thus enabled to prosecute their nefarious designs to greater advantage and without detection.

For the American Bee Gazette.

I have received great pleasure from the perusal of the AMERICAN BEE JOURNAL, and am heartily glad you have decided to continue its publication. I consider myself fortunate in possessing the first volume, which I have well bound, and would not part with it from my library for many times its cost. The information which you gather and disseminate in the monthly issues of the JOURNAL is worth to any intelligent bee-keeper, and to those at all interested in the rural economy and progress of our country, more than its subscription price, and I am sure the seventy-thousand bee-keepers in our country will not allow it to suffer for want of patronage.

Knowing my position, my dear sir, you can form some idea of my duties, but I turn from them long enough to write you a word of congratulation and encouragement, and to assure you that I shall lose no opportunity of urging the claims of your most valuable publication upon the attention of our readers.

The past season has been a very unfavorable one for bee-keepers in this State. The abundance of wet weather throughout the best part of the year for storing honey, rendered it impossible for the bees to secure the necessary amount demanded for their own winter needs, to say nothing of a surplus. I am told by bee-keepers that a large number of swarms have not honey enough to carry them through the winter, and what is stored is of very poor quality.

I am not engaged in keeping bees, and am interested in agriculture only, as I am interested in whatever relates to any branch of rural industry practiced by our countrymen.

Sincerely yours,

S. I. B.

AUGUSTA, ME., Dec., 1866.

For the American Bee Gazette.

Editor American Bee Gazette:

Being a reader of your *Bee Gazette*, I found that you desire contributions for your paper from all bee-keepers. I therefore send you the following lines, for use, if you find them important enough:

1. By an examination of a colony of black bees that was forced about six or eight weeks before, I found it without brood of any kind, and only a small number of bees. I therefore concluded that the colony was without a queen, and introduced an Italian queen. This queen I found was killed three or four days afterwards. Not having taken any precaution in introducing her, I considered this the fault of the queen's being killed. I concluded to introduce another queen, and not being sure of the queenlessness of the stock, I forced most all the bees out of the hive, and carefully examined them, but could not find a queen. I then let my Italian queen run among these bees, and they seemed very much pleased with her. The swarm then was put back into its hive. The queen so introduced was also found dead in a few days. About four weeks after this, the hive was found still without brood, and I concluded that it had one of those little worker-like queens which usually do not become fertile.

2. Mr. A. Fuerbringer had divided an Italian colony ten days after swarming the first time, giving some queen cells to both parts. One of these parts lost its queen before she became fertile. Supplied with broodcomb, it built a number of queen cells, some of which were taken away. One of those left hatched, and the young queen destroyed the remainder of the cells. By a close examination two weeks afterwards, no brood, eggs, or queen could be found. A fertile queen given to Mr. F. by a neighboring bee-keeper, was, after being caged in this hive for forty-eight hours, introduced and accepted. This queen was found killed before the entrance of the hive about eight days afterwards. On examining the hive, two combs were found filled with sealed brood, eggs, and larvæ. On examination a week later, no queen or queen-cells, or any eggs, or very small brood, was found.

Informed of all this, I concluded to examine this vexatious swarm. By carefully looking over the two brood combs, I found a little queenlike-looking bee, almost smaller than a worker, but showing the queenshape in her abdomen. This bee or queen was killed, and in the evening the swarm showed all the signs of a hive that had lost its queen. A fertile queen, afterwards introduced, was accepted by this hive, and it is in good condition now.

3. A stock that had been forced about seven weeks before was found, on examination, to contain drone brood in worker comb, and I concluded that it had lost its queen. I introduced a queen into it, but could find no other than drone-brood two weeks afterwards. I therefore concluded that the queen put in was either killed by the bees or by a rival queen, and forced to swarm. By an examination of

the bees I could not find a queen. I therefore let an Italian queen run among them. Waiting to see what the bees would do with her, I saw in a few minutes a very small black queen chasing my Italian queen. This black queen was killed, and the swarm then rehived. The stock raised a good number of bees yet, and is in good condition now.

The foregoing caused me to lay down the following rules for the future:

a. If a hive is found without worker-brood forty days after the old queen was taken from it or has swarmed out, and it is heavy enough to winter, the bees in it are to be brimstoned; and the queen and bees of a light colony are to be put into it, after the hive of the killed swarm is placed on the stand of the light swarm.

b. If a hive, forty days after swarming or being forced, is found with drone-brood in worker cells, the bees are to be killed, and the hive treated as above.

c. If a hive, forty days after swarming or being forced, is found with drone-brood in drone-combs, a queen is to be introduced with caution, if the swarm be not too small, or the season not too late.

Some reader may ask—Is killing the bees necessary? I say, no! But the few bees found in such hives are not worth the time necessary to hunt out one of the small queens mentioned.

A. GRIMM.

JEFFERSON, WIS., December 10, 1866.

[From the (London) Journal of Horticulture.]

The Egyptian Bee.

PART V.

HOW I PROCEEDED TO INCREASE AND MULTIPLY IT.

Before entering upon a description of the attempts which I made to propagate the *Apis fasciata* during the autumn of last year, and the degree of success by which they were attended, I may be permitted again to refer to my correspondence with Herr Vogel, which terminated on his part with a long letter in his own language, which reached me in September, and from which I make the following extracts:

"The Egyptian queen which you received was reared in June last; she is, therefore, about four months old. This queen has received a true impregnation, because the mothers that were reared from her brood here produced true Egyptians. I sent you this queen because the queens that were thus reared became all beautiful and true Egyptians.

"The cells of the Egyptian bees are one-tenth narrower than the cells of our northern bee, so that ten Egyptian cells, including the partition walls, are equal in width to nine cells of our bees. If the Egyptian bee is bred in the combs of *Apis mellifica*, and fed by native bees, it becomes bodily somewhat larger, and also makes somewhat larger cells. The black or the Italian bees no doubt feed the Egyptian larvæ with abundance of pollen, wherefore the young bees bred in their larger cells are of un-

usual size when hatched out. If, however, there are only Egyptians in the hive, all the bees will ultimately revert to their original size."

Herr Vogel then gives his opinion of my hives, of which I had sent him a description, accompanied by a sketch of one of my frames, which in respect to size occupy an intermediate position between the large ones in use in America, and the diminutive ones of Germany, and are, as I believe, the best adapted for our climate. He says:

"The Egyptian bees require as large a hive as the Italian. I think your hive is too wide. The Dzierzon hive is made but ten inches wide, (Prussian measure.) Hives provided with frames are eleven inches in width, but the combs are ther also but ten inches wide, as the frame stands off a quarter of an inch on each side, and each part on either side is a quarter of an inch thick, consequently four quarters, or one inch, must be deducted. We find here that the bees winter better in narrow hives, because the warmth is better kept together in them. Our hives have three stories, one above another, (ständerstöck,) and each story contains from ten to twelve combs, so that the stock, when filled, contains from thirty to thirty-six combs, each ten inches wide, and about 8 inches high. The 'lagerstock' has but two stories, each story containing about fifteen combs, both taken together, about thirty. My opinion as to the size of your hives may, however, be wrong, because I know England, its climate, and bee-pasture only from books, and, therefore, may be mistaken. The breadth of our comb-bars is exactly an inch, and differs from the breadth of your bars. Your bars are too narrow, as a brood-comb is exactly one inch thick; but will just suit the Egyptian bee, whose comb is not so thick."

Referring to regicidal attacks on young queens, Herr Vogel says:

"It has frequently happened to me that young queens were killed by their own workers; but this was only the case after their returning from a successful wedding flight." For certain reasons which Herr Vogel states, they then seem strange to the bees, wherefore they are often treated hostilely, nay, even killed.

"You are quite right," continues Herr Vogel, "in saying that Egyptian queens mating with Italian drones produce only Egyptian drones. Observation has shown this also in the present year. Likewise Egyptian queens impregnated by black drones bred only pure Egyptian drones. If the young queen is a true one by birth, the mating with a drone of another species has no influence whatever on her male offspring."

"I do not find that the Egyptian queens quit their cells sooner than the Italian. If this has been the case with you, then the bees have chosen a larvæ more than three days old, from which to raise a queen, wherefore your queens hatched sooner. It has repeatedly happened to me that queens left their cells on the tenth day; but this was only the case when the bees had larvæ, four or five days old, from which to rear a queen."

"You did well to raise young Egyptian

queens this summer. Next spring you will have Egyptian drones in greater abundance. The latter are on the whole of a more beautiful color than the Italian drones, which, as a rule, vary in color."

Being willing to conclude what I thought worth extracting from Herr Vogel's letters, I have advanced somewhat too far in point of time, and must therefore go back to the end of July, when I received the Egyptian queen. As before stated, she alone survived the journey and the hazards of an introduction to a small colony of Italians, which I immediately proceeded to strengthen by the careful selection and gradual addition of ripe brood-combs from other and stronger stocks. This process being necessarily somewhat slow, I could not wait for its conclusion, but was, of course, compelled to defer operations until my Lilliputian Semiramis had so far recovered from the fatigues and dangers incident to her journey and translation to an alien stock, to commence the all-important duty of oviposition in her new realm. It was not, therefore, until the 7th of August that I found myself in a position to take the first step towards propagating my new and very interesting acquisition. As it was essential that in endeavoring after this end I should not deteriorate even in the slightest degree the little colony presided over by the illustrious stranger whose dangers and adventures formed the subject of my last paper, I may be excused for entering somewhat into detail in describing the process by which the prosperity of the original colony was not only not retarded, but was even actually advanced by the measures adopted for propagating the new race. Selecting, then, one of the original combs in which her Egyptian majesty had by this time deposited a good many eggs, I, on the above-mentioned day, swept every bee from it back into the hive with a feather, and supplied its place with a comb full of sealed brood from another hive, thus actually benefitting and strengthening the Egyptian stock. Putting the abstracted comb into a nucleus-box, I added to it two honey-combs, placed on each side, and brushed into the box all the bees from three brood-combs lifted out of a strong hive for that purpose. Substituting a sheet of perforated zinc for the crown-board of the nucleus-box, and closing the entrance by means of the same material, I at once conveyed it to a dark room, where it remained until dusk. As soon as darkness had pretty well set in, it was placed on its intended stand, the entrance unbarred, and the crown-board replaced. A grand rush was, of course, the result, but it was too dark to take wing, and the involuntary truants were, perforce, compelled to remain where they were until the next morning, when numbers, doubtless, returned to their own hive. Notwithstanding this desertion, so many bees remained that had never taken flight, and, consequently, knew not their way home, that royal cells were started in due course, and the first queen was hatched on the 22d of August, just fifteen days after the formation of the little artificial colony.

I had a few, but only a very few, full-sized Italian drones remaining, and my principal

dependence for the fecundation of these late-bred princesses was on the services of a number of small Ligurian drones bred in worker-cells, and which have on this account been deemed by some to be incapable of fulfilling their proper functions. Evidences of fecundation were, therefore, watched for with no little anxiety, and it will readily be conceived with what exultation the fact was hailed, that on the 9th of September, and on the eighteenth day of her existence, it was found that this, the first English-bred Egyptian queen-bee, had become fully capable of performing every duty connected with her position.—A DEVONSHIRE BEE-KEEPER.

For the American Bee Gazette.

Ventilating Bee-Hives.

There are many errors in bee-culture that pass for truth. This is owing, perhaps, to the fact that authors of books and articles in the papers are in the habit of copying from others and from each other what they do not know themselves. Consequently, most of the errors of the early writers are handed down through all of the different "original" works on bee-culture, and vouched for by the authors, thus causing them to be received as authentic facts by such green ones as myself, who do not know any better. But I have noticed bees some; I have studied bees some; and I have read some about bees. The more I do of either, the more I am convinced that there is a great amount of *bosh* in the writings of most if not all of those who are received as authority on this subject. I have been led to these remarks by reading an article in your July number on Wintering Bees, from the *Ohio Cultivator*, wherein it is laid down as a rule that "cannot be controverted," "to afford them a free ventilation of air under all circumstances."

The editor says: "Ventilation is as essential to bees as pure air is to men. A dozen hives of bees placed in a close room, ten or twelve feet square, would destroy the purity of the air in a few days, so much so, that a lighted candle would go out on being placed therein, &c." Mr. E. Kirby in same number goes into a learned argument about oxygen and nitrogen and carbonic acid gas, to show Mr. Fairchild why his Italian bees died last winter. Turning from your valuable paper to some half dozen authors at hand, I find them all talking in the same strain about "ventilation" and "smothering," and all seem to be under the impression that a bee-hive is a kind of gas-works, where the little people that live therein, when they are not making honey, are making poisonous gases to smother themselves with. Is this so? And if so, should not bees be informed of it, so that when we make air-holes for them, they won't spend their valuable time in hunting up something to stop them up with? Some of the new-fangled Italians or Egyptians may know better, but our poor, ignorant bees don't. If so, why will they, when they select a tree in the woods for their abode, often go in at a little hole in a limb, and go down instead of up into the body

of the tree, if they know that they are but making a black hole of Calcutta, in which it is only a question of time as to how long they will live? And by reading the *Ohio Cultivator* they could tell exactly, by a little figuring, how long the "candle of life would hold out to burn." State the sum thus:

If a swarm of bees could fill with carbonic acid gas a room, say 12 feet square and 10 feet high, 12x12x10—1440 cubic feet in "a few," say three days, how long would it take them to fill a hole containing 1x1x3—3 cubic feet? If figures don't lie, it would take just nine minutes.

But, seriously. In the northern part of Germany it is quite common to bury the hives in the ground, stopping up all air-holes; and they let them so remain for months; and the bees not only come out alive in the spring, but consume far less food than they do when every cold blast of winter can find passage through them. Mr. Bruckish, of Texas, states, in the Patent Office Report for 1860, that he has made repeated experiments on the subject. In November, 1848, he buried two hives two inches deep, pressed the earth down rather hard, and allowed no air-holes. On the 11th of March, 1849, they were dug out again. They were all lively.

I, on one occasion, in the heat of summer, stopped the only hole there was in a hive—the entrance—for thirty-six hours or more, without any injury to the bees, but I thereby kept a swarm that would otherwise have gone off to the woods.

If these learned apiarians would go out into the "rural districts" where bees are kept in hollow log gums with a two-inch plank nailed over the top, and caulked with tow, or pointed with mud; where no wire-gauze-covered air-holes are left, and ventilation never thought of; where the entrance hole is half the winter stopped up with ice, and not the least bit of air admitted; and there talk about smothering bees to death, they would be laughed at for their ignorance.

D. L. ADAIR.

HAWESVILLE, Ky.

For the American Bee Journal and Gazette.

Two Classes of Hives.

There are but two *classes* of hives, but of each class there are many styles or kinds. These two classes are made up of *box-hives* and *frame-hives*. The combs in box-hives are *stationary*, but in frame-hives are *movable*.

If writers on the bee-subject would keep the above facts in remembrance, they will be saved the trouble and annoyance of using a multiplicity of terms, such as movable combs, common bee-hives, &c.

I am decidedly in favor of using simple, practical, and yet purely technical terms.

M. M. BALDRIDGE.

ST. CHARLES, KANE CO., ILL.

NOTHING can be more interesting to a naturalist than to witness the process which the bee employs in making her nest.

For the American Bee Journal.

WASHINGTON, PA., Dec. 29, 1866.

Dear Bee Journal:

I began bee-keeping with one good stock of bees; came in possession of my second when taking possession of my country residence at West-End on the first day of April, 1865; obtained in March, 1866, of a neighbor, on shares, four stocks, (one of which at the time was dying with a superabundance of bee-bread and nice-nests,) and now I have twenty stocks in all, and all in good condition, none of which cost me anything, and, in this, they say, consists "the luck."

Here is my mode of operation:

The stock I began with in 1864 was very heavy in the spring of 1865, and, in accordance with woman's "aboriginal instincts," Mamma must have some honey, to give, as Mr. Lorenz has it, "the children some honey-bread this morning." Accordingly the bee-man was summoned to produce this longed-for treasure, and the more the bee-man produced, the more Mamma and the children were delighted. The bee-man even was delighted with his labor, and approvingly quoting Mr. Quinby, was "in favor of performing the whole operation at once," and at once did it.

Of the stock of bees which were left on the premises by its former owner, as not worth moving, the bee-man said: "They must surely die, for why, you see, they haven't as much enough as the others have had too much of it, and so, you see, the black combs stay better in there, to help 'em fill up the skep." This moralizing was beyond my comprehension, and so I nodded assent to its profundity. The bee-man departed, and so did the honey from my poor bees; and what could I do, now, to save them? Listen, gentle reader, to what you have never heard before.

There stood beneath the cellar-stairs the remnants of a barrel of sorgho molasses, and, as "necessity is the mother of invention," every time Mamma gave the children some "honey-bread," Papa helped his pets with a jug of 'lasses, and by the time the former were out of honey, my bees were in condition again "to shift for themselves."

Moral—*Esta fabula manifesta.*

1st. That in 1865 the writer knew nothing about bees.

2d. That bees ought not to be pruned in spring.

3d. That bees can be fed on sorgho molasses; and

4th. That it is not recommended to feed them on sorgho molasses.

So much for my bees in 1865, with this addition, that from the 5th of May till the blossoming of white clover in June, I fed them the sorgho molasses, at the rate of a tea-cup full each, daily, and that they did neither swarm nor store any surplus, but were in excellent condition to winter.

This year (1866) I endeavored to manage better. Last winter, namely, I procured Rev. L. L. Langstroth's excellent treatise on "The

Hive and Honey-Bee." I read and re-read the book with much interest and satisfaction, especially those parts treating of artificial swarming, the rearing of queens, and the Italian bee. Early in the year one of my neighbors offered to me his bees on shares. I agreed to the proposition, provided, however, that he furnish me with an Italian queen from the apiary of L. L. Langstroth & Son. The queen was ordered. All the stocks were meanwhile snugly transferred into frames, and liberally fed with sugar syrup, (equal quantities of soft water and white sugar boiled to a syrupy consistency,) increasing the dose from a gill to a half pint, to a pint; from a pint, diminishing to a half pint, and to a gill again, till June.

The Italian queen arrived, was introduced *secundum artem*, but was killed a few days later, and so I had to wait till August for another pure queen, from which I raised six hybrids, all of which I introduced safely to as many artificial swarms, made in June. During the month of June and early part of July, whenever a hive was full of comb and bees, I divided it, giving it either a queen-cell or a laying black queen; and early in August I had fifteen stocks of bees, all furnished with full combs and plenty of workers. Towards the end of July, when pasturage began to fail, I helped them to white sugar, as above, only in smaller doses.

My neighbors now began to become very uneasy. Their bees, which did not swarm, hung in heavy clusters beneath their alighting-boards, and fearing there would be too many bees to winter on the honey stored by them, came from all directions, entreating me to take them all away from the outside, *lest they go in again*. I, of course, helped myself to three more good swarms by shaking three or four such outside clusters upon a sheet, before a hive together, giving them two combs of honey for a dowry, and a young queen to keep them company. These collected swarms I placed in a field of buckwheat, and, subsequently, fattened them up to the desired standard as an experiment in wintering bees on sorghom.

And there was yet another chance left me to obtain two more strong swarms to complete the score, to wit:

The time came when those condemned after-swarms were to be "taken up." One man had five of them, at fifty cents each, and another had three, all for one dollar. I took them home, cut out their combs, fastened them with wire and wire-thread into frames, shook out the bees, hunted out all the young queens, except two, one of which I left to every four swarms put together into one hive, adding a frame or two of honey from a well-provided hive, and fed these also. The young queens thus obtained I exchanged with those I knew were older, and this operation was the last of the series during the year, with the exception of ascertaining that each hive had a fertile queen, before placing them into a well-darkened, dry, and airy cellar, over winter.

Having thus increased my apiary from five swarms to twenty, I shall be thankful if nineteen of them survive. But whether those I dosed with sorgho molasses will do so or not,

is a problem more difficult to solve than the transmuting of thirteen stocks of blacks and six stocks of hybrids into pure Italians, from one mother, in one season.

The reader, moreover, need not be told that I had no use for a "*scientific honey-taker*" this year.

ALSATIUS.

For the American Bee Journal.

Latent Patents!

MR. EDITOR: I noticed an article in your last number from Mr. Langstroth in relation to my "circular" and patent of April, 5, 1864. While admitting that said patent covers the "mechanical devices" described, he egregiously asserts that I claimed the manipulations of the "circular" as a "process" of itself patented. That is a mistake. I claim the combination of the "devices," "when constructed and operated as described," *as granted*, whether used in my hive or any other; and Mr. L. ought to see the propriety of marking patents (with dates, &c.) as such.

Since Mr. Langstroth has been so kind as to attempt to "ventilate" my patents, it might appear quite as well to modify his claims to "Patented Movable Comb Frames," since, by reading his advertisements, the public are led to believe that his extended patent is granted on "Movable Comb Frames," instead of his improved "*features*" in the use and arrangement of such frames. I am aware that "mistakes happen in the best families."

W. A. FLANDERS.

SHELBY, OHIO, Jan. 3, 1867.

For the American Bee Journal.

Barren Queen.

To make a journal of this kind interesting, we need a variety of topics. For this reason I present to its readers the following incident which came under my observation during the past summer. It is this—a fertile queen, to all appearances, incapable of laying eggs.

On account of the beautiful color of this queen, (Italian,) I felt choice of her, and was very anxious to have her become fertile.

She was between two and three weeks old before she showed signs of fertility, but as she did not commence to lay eggs in the nucleus, I transferred her to a full swarm, and still she remained unfruitful. I often examined the combs, but never saw an egg while she remained. I often saw her with her abdomen in the cells, to all appearances ovipositing. I made an examination of the cells as soon as she left them, but never discovered any eggs.

To all outward appearance she was a perfect queen; large in size, and moved among the bees as a fertile queen. I think it is evident that there was a defect in her organs or muscles for depositing eggs. Perhaps this is a frequent occurrence with many, but it is entirely new with me.

C. B. BIGLOW.

PERKINSVILLE, VT., Dec., 1867.

[From the (London) Journal of Horticulture.]

Apiarian Varieties.

The following extracts are taken from an article written by the great German apiarian Dzierzon during the spring of the present year. For the convenience of English readers I have thought it better to alter the thermometrical readings from Réaumur's scale to that of Fahrenheit.—A DEVONSHIRE BEE-KEEPER.

EARLY BREEDING.—As we know that strong stocks of bees often begin breeding in January, we find that in former years, when a little mild weather has occurred during that month, a tolerably large quantity of brood has been destroyed by severe weather in the beginning of February, owing to the bees being compelled to cluster together and betake themselves to the combs which contain honey, leaving the brood exposed to the cold. It was, therefore, to be expected that during the winter of 1865-6, which was for the most part exceedingly mild, egg-laying would have commenced earlier, and have been more extensive than usual, but this has been by no means the case. During an examination of strong stocks well provided with pollen, which I undertook after the middle of February, I found either no brood at all, or else much less than existed three weeks earlier in former years, and in much weaker stocks. How, then, is this phenomenon to be explained? Many would, perhaps, believe that the bees, taught by instinct, foresaw a still greater degree of cold during a second winter; but, if so, why did they not foresee the same in former years? Evidently something remains to be explained. Moisture, of which we are aware bees have great need in the preparation of food for their young, will, it is well known, promote breeding, whilst its absence, during even a higher temperature, will restrict and hinder it; but with a mild atmosphere, when the temperature outside and inside the hives differs but slightly, it is natural that little or no moisture should be condensed in their interior.* Then, also, during mild weather the bees remain much quieter, as they require to make no great exertion to supply the loss of heat, whilst the temperature in the centre of the hive may even fall lower than usual without danger of the bees on the outside of the cluster becoming chilled, just as an oven in a mild atmosphere needs not so much fuel as during severe cold. The queen and nurses, therefore, which dwell in the centre of the cluster, derive from it a greater degree of warmth during cold than in mild weather, and may in this way be impelled to the deposit of eggs, and to the nurture of brood.

*Owing, probably, to their distance from the sea, and the air being denuded of its moisture during its passage over the vast sandy plains of the Continent, there appears no reason to doubt that the atmosphere of many parts of Germany is much drier than that of England. For this reason, and in order to supply the bees with water, without compelling them to seek for it in the open air during cold weather, German apiarians endeavor to promote the condensation of a certain amount of moisture within the hive itself, thus reversing the practice of English bee-keepers, who generally regard the presence of internal moisture as an unmitigated evil, and one that is by all means to be avoided.—A DEVONSHIRE BEE-KEEPER.

It may be remarked, however, that it is only the hatching-out of brood which can be beneficial to the bee-keeper. Thus, egg-laying is desired in order that the stocks by its means may not only be kept from retrograding, but may even make progress. If, however, breeding stops at this stage by reason of the stores of honey and pollen falling short before the temperature of the outer air permits of their being replenished, then are the disadvantages of early breeding found to be greater than its advantages.

ON THE DEGREE OF WARMTH NECESSARY FOR THE BEE.—The limits of temperature within which a single bee can exist have been far too widely extended. It cannot be denied that bees are capable of a short flight with the thermometer at 45° , or that they may, at any rate when heated, take wing and return quickly to the hive when it is even a few degrees colder; but the question is, At what temperature can they exist singly for an extended period outside the hive? And it is certain that they may become chilled at as high a temperature as 62° , whilst with the thermometer at 52° they gradually lose the use of their limbs until they can neither crawl nor eat. When, however, Herr Schönfeld extends the opposite limit to 134° , he evidently goes much beyond the truth. Such a more than semi-boiling heat permits very little animated nature to quit the shade, but least of all is the bee able to withstand it. Herr Schönfeld has evidently confounded the heat communicated to solid bodies with the temperature of the surrounding air. Never but once have I seen the thermometer stand so high as 134° , even when exposed to the full noontide heat, but even then it was certainly only the adjacent window-frame and the thermometer-bulb which had become so heated from long exposure to the sun in a confined situation, as I am satisfied that the temperature of the surrounding atmosphere did not exceed 100° . As heated air becomes rarefied, and therefore lighter, it ascends, its place being constantly supplied by that which is cooler. Hence the shimmering haze which overspreads the plains when exposed during a calm day to the glowing heat of a summer's sun. Thus does continual fluctuation produce a continual balance of the disturbed equilibrium; the bees themselves assisting, when exposed to the burning rays of the sun, by fanning with their wings, and driving the heated air behind them, and in this way producing a cooler temperature. That bees do not drown readily is well known, but put them in water heated to 134° , and observe the consequence. Herr Schönfeld may convince himself, by careful observation and experience, that the extremes fixed by him at 45° to 134° are much too wide, and should be reduced by nearly one-half—to the limits of 59° to 105° .—DZIERZON.

THE hive-bee is probably never, strictly speaking, torpid in the winter, though, with regard to the precise state in which it passes the winter, a considerable difference of opinion has obtained.

Bee-Cells in Honey-Combs.

[From "Homes Without Hands."]

The bee has always been one of the most interesting insects to mankind on account of the direct benefit which it confers upon the human race. There are many other insects which are in reality quite as useful to us, and, indeed, are indispensable, but which we neglect because we are ignorant of the importance and value of their labors. The bee, however, furnishes two powerful and tangible arguments in its favor—namely, honey and wax, and is sure, therefore, to enlist our sympathies in its behalf.

Independently, however, of these claims to our notice, if the bee never made an ounce of honey; if the wax were as useless to us as a wasp-comb; if the insect were a mere stinging creature, with a tetchy temper, it would still deserve our admiration, on account of the wonderful manner in which it constitutes its social home, and the method by which that home is regulated.

I need not, in this place, repeat the well-known facts respecting the constitution of the bees, nor describe the duties of the queen, drones, and workers. Suffice it to say that the former is the mother as well as the queen of the hive, and that the workers are undeveloped females, which are properly called neuters, and that the drones are males which do not work and have no stings.

There are three kinds of cells in a hive—the worker cell, the drone cell, and the royal cell, which latter is usually destroyed, or at least partially razed by the workers after the young queen has been hatched. It is totally unlike the nursery of a subject, whether drone or worker, and is almost always placed on the edge of a comb. It is very much larger than an ordinary cell, and is built with a lavish expenditure of wax that affords a curious contrast with the rigid economy observed in the structure of the other cells.

Although the primary object of the worker and drone cells is to serve as nurseries and storehouses, they are also made to answer other purposes. When the bee seeks repose, it almost invariably creeps into a cell and buries itself deep therein, the whole head, thorax, and part of the abdomen being hidden. If a hive be examined in the winter time, every cell that happens to be empty, within the range of the cluster, will be found tenanted by a bee; and when the poor insects are put to death by the absurd and cruel plan of smothering them with the fumes of burning sulphur, they will be found to have vainly sought escape from the suffocating vapor by forcing themselves into the recesses of the empty cells.

As a general fact the bees place the honey in the coolest part of the hive, and the young brood in the warmest, so that bee-keepers are enabled to procure honey-comb of wonderful purity by affixing glass or wooden caps to their hives. These caps are necessarily cooler than the body of the hive, and therein the bees will store large quantities of honey.

The chief point which distinguishes the comb

of the hive-bee from that of other insects, is the manner in which the cells are arranged in a double series. The combs of the wasp or the hornet are single, and are arranged horizontally, so that their cells are vertical, with the mouths downward, and the bases upward, the united bases forming a floor on which the nurse wasps can walk while feeding the young inclosed in the row of cells immediately above them.

Such, however, is not the case with the hive-bee. As every one knows who has seen a bee-comb, the cells are laid nearly horizontally, and in a double series, just as if a couple of thimbles were laid on the table, with the points touching each other, and their mouths pointing in opposite directions. Increase the number of thimbles, and there will be a tolerable imitation of a bee-comb.

There is another point which must now be examined. If the bases of the cells were to be rounded like those of the thimbles, it is clear that they would have but little adhesion to each other, and that a large amount of space would be wasted. The simplest plan of obviating these defects is evidently to square off the rounded bases, and to fill up the ends of each cell with a hexagonal flat plate, which is actually done by the wasp.

If, however, we look at a piece of bee-comb, we shall find that no such arrangement is employed, but that the bottom of each cell is formed into a kind of three-sided cup. Now, if we break away the walls of the cell so as only to leave the bases, we shall see that each cup consists of three lozenge-shaped plates of wax, all the lozenges being exactly alike.

These lozenge-shaped plates contain the key to the bee-cell, and their properties will therefore be explained at length. Before doing so, I must acknowledge my thanks to the Rev. Walter Mitchell, vicar and hospitaler at St. Bartholomew's Hospital, who has long exercised his well-known mathematical powers on this subject, and has kindly supplied me with the outline of the present history.

If a single cell be isolated, it will be seen that the sides rise from the outer edges of the three lozenges above mentioned, so that there are of course six sides, the transverse section of which gives a perfect hexagon. Many years ago, Maraldi, being struck with the fact that the

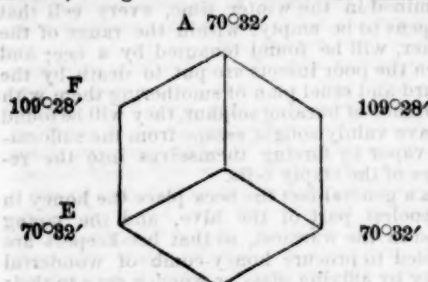


Fig. 1.

lozenge-shaped plates always had the same angles, took the trouble to measure them, and

found that in each lozenge the large angles measured $109^{\circ}28'$, and the smaller $70^{\circ}32'$, the two together making 180° , the equivalent of two right angles. He also noted the fact that the apex of the three-sided cup was formed by the union of three of the greater angles. The three united lozenges are seen at Fig. 1.

Some time afterward, Reaumur, thinking that this remarkable uniformity of angle might have some connection with the wonderful economy of space which is observable in the bee-comb, hit upon a very ingenious plan. Without mentioning his reasons for the question, he asked K nig, the mathematician, to make the following calculation: Given a hexagonal vessel terminated by three lozenge-shaped plates, what are the angles which would give the greatest amount of space with the least amount of material?

K nig made his calculations, and found that the angles were $129^{\circ}26'$ and $70^{\circ}34'$, almost precisely agreeing with the measurements of Maraldi. The reader is requested to remember these angles.

Reaumur, on receiving the answer, concluded that the bee had very nearly solved the difficult mathematical problem, the difference between the measurement and the calculation being so small as to be practically negatived in the actual construction of so small an object as the bee-cell.

Mathematicians were naturally delighted with the result of the investigation, for it showed how beautifully practical science could be aided by theoretical knowledge; and the construction of the bee-cell became a famous problem in the economy of nature. In comparison with the honey which the cell is intended to contain, the wax is a rare and costly substance, secreted in very small quantities, and requiring much time and a large expenditure of honey for its production. It is therefore essential that the quantity of wax employed in making the comb should be as little, and that of the honey which could be stored in it as great, as possible.

For a long time these statements remained uncontroverted. Any one with the proper instruments could measure the angles for himself, and the calculations of a mathematician like K nig would hardly be questioned. However, Maclaurin, the well-known Scotch mathematician, was not satisfied. The two results very nearly tallied with each other, but not quite, and he felt that in a mathematical question precision was a necessity. So he tried the whole question himself, and found Maraldi's measurement correct—namely, $109^{\circ}28'$ and $70^{\circ}32'$.

He then set to work at the problem which was worked out by K nig, and found that the true theoretical angles were $109^{\circ}28'$ and $70^{\circ}32'$, precisely corresponding with the actual measurement of the bee-cell.

Another question now arose. How did this discrepancy occur? On investigation, it was found that no blame attached to K nig, but that the error lay in the book of Logarithms which he used. Thus a mistake in a mathematical work was accidentally discovered by measuring the angles of a bee-cell—a mistake sufficiently great to have caused the loss of a ship

whose captain happened to use a copy of the same Logarithmic tables for calculating his longitudes.

Now let us see how this beautiful lozenge is made. There is not the least difficulty in drawing it. Make any square, $A B C D$, (Fig. 2,) and draw the diagonal $A C$.

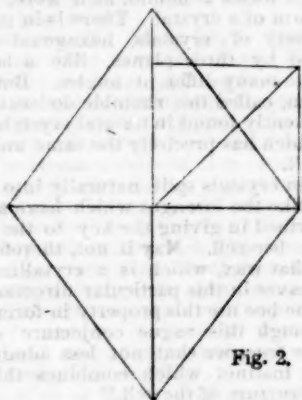


Fig. 2.

Produce $B A$ toward F and $A D$ both ways to any distance.

Make $A E$ and $A G$ equal to $A C$, and make $A F$ equal to $A B$. Join the points $E F G B$, and you have the required figure.

Now comes the beautiful point. If we take $A B$ as 1, being one side of the square on which the lozenge is founded, $A E$ and $A G$ will be equal to the square of 2, and $E F$, $F G$, and $B E$ will be equal to the square of 3, as can be seen at a glance by any one who has advanced as far as the 47th proposition of the first book of Euclid.

Perhaps some of my readers may say that all these figures may be very true, but that they do not show how the cell is formed. If the reader will refer to Fig. 3, he will see how the theory

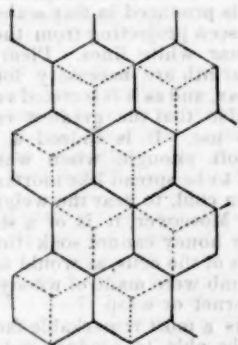


Fig. 3.

may be reduced to practice. After he has drawn the lozenge-shaped figure which has just been described, let him draw upon a card-board nine of them, as is shown in the illustration, Fig. 4. Then let him cut out the figure, and

draw his pen-knife half through the card-board at all the lines of junction. He will then find that the card-board will fold into an exact model of a bee-cell, the three lozenges which project from the sides forming the base, and the others the sides. This cell will of course have very short sides; but by the simple expedient of widening the lozenges which form the sides, without altering the angles, the imitation cell can be made of any desired length.

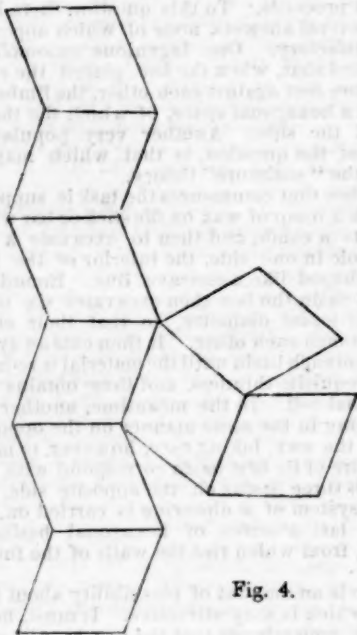


Fig. 4.

The best way of showing this beautiful structure is to make two models, one to lie flat or be folded and opened at discretion, and the other formed into a cell, and the angles written on the card-board. A little gummed paper will hold the sides together, so that the model can be handled without breaking. A very amusing puzzle may be formed by cutting out the nine lozenge-shaped pieces of card-board, and requesting that they may be so put together as to form the model of a bee-cell.

We have not yet exhausted the wonders of the bee-comb.

If we take a piece of comb from which all the cells have been removed, and hold it up to the light, we shall see that the cells are not placed opposite to each other, but that the three lozenges which form the base of one cell form part of the base of three other cells, as is seen in Fig. 3. Thus a still further economy of material is attained, while the strength is enormously increased, each of the edges formed by the junction of two lozenges making a buttress which performs precisely the same office as the buttresses of architecture do.

The same principle is observable throughout

the cell, which even at its edges is supported by three cells, and gives a partial support to three others. As the walls of the cells are extremely thin, the bee always strengthens their mouths by a thick edging of harder wax than that with which the cell itself is made. The engineer who plans girders, boilers, and other objects of a similar character, acts in precisely the same manner, and strengthens the comparatively thin and yielding plates by flanges and angle-irons.

Many inquirers have asked themselves how the bee constructs the comb, and on what principle it proceeds. To this question there have been several answers, none of which appear to be satisfactory. One ingenious entomologist remarked that, when the bee placed the claws of its fore-feet against each other, the limbs embraced a hexagonal space, of which the thorax formed the side. Another very popular solution of the question, is that which may be called the "sculpture" theory.

The bee that commences the task is supposed to work a lump of wax on the stick or bar which supports a comb, and then to excavate a circular hole in one side, the interior of the hole being shaped like a concave line. Round this hole or basin the bee then excavates six other holes of equal diameter, so that their edges nearly touch each other. It then cuts away the wax from each basin until the material is reduced to the requisite thinness, and thus obtains the hexagonal cell. In the meantime, another bee is working in the same manner on the opposite side of the wax, taking care, however, to make the centre of its first basin correspond with the union of three basins on the opposite side. A similar system of sculpturing is carried on, so that at last a series of hexagonal basins is formed, from which rise the walls of the future cells.

There is an amount of plausibility about this theory which is very attractive. It must, however, be remembered that the bee is still supposed to execute problems which are as difficult as that which they are presumed to explain.

In the first place, on this theory, the bee must strike perfect circles from centres, the distance of which from each other must be accurately adjusted. Again, these centres must be so placed that the centre of the circle sculptured on one side of the comb must be equidistant from the centres of the three adjacent circles on the other side—a problem of no easy accomplishment, even with the aid of rule and compass. Then, if the circles be not perfect, or these centres be wrongly placed, or the hollow of one cut deeper than that of another, or the hemispherical form of the hollow not precisely just, the whole accuracy of the angles is destroyed, and the entire comb would be as distorted as the first essays of a young carpenter.

Then there is another explanation which may be called the "equal pressure" theory. The bee is, according to the advocates of this theory, supposed to construct all the cells of a cylindrical shape, and the cells are supposed to assume the hexagonal form by equal pressure in all directions. Every one knows that cylinders made of a yielding substance always become hexagonal if pressed together, and a similar

process was supposed to cause the hexagonal shape of the bee-cell.

There is another theory which I believe to be entirely original, which is suggested by the well-known mathematician and crystallographer above-mentioned. Mr. Mitchell writes to me as follows:

"It may not be out of place to remark that the bee-cell forms a mould, as it were, of the natural form of a crystal. There is in nature a great variety of crystals, hexagonal prisms terminated by three planes, like a bee-cell. These have many different angles. But there is one form, called the rhombic dodecahedron, very frequently found in natural crystals of the garnet, which has precisely the same angles as the bee-cell.

"Certain crystals split naturally into planes precisely like the lozenges which have already been described in giving the key to the structure of the bee-cell. May it not, therefore, be possible that wax, which is a crystalline substance, cleaves in this particular direction; and does not the bee use this property in forming its cell? Though this vague conjecture should prove to be true, we shall not less admire the marvelous instinct which combines this fact with the structure of the cell."

It would of course be easy to fill many pages with the account of the hive-bee and its habits; but we shall here only mention particularly the material of which the comb is made.

The other hymenoptera obtain their materials from external sources. The hornet and wasp have recourse to trees and branches, and bear home in their mouths the bundles of woody fibre which they have gnawed away. The upholsterer and leaf-cutter bees are indebted to the petals and leaves of various plants, and various wood-boring insects make their homes of the woody particles which they have nibbled away. The bee, however, obtains her wax in a very different manner.

If the body of a worker-bee be carefully examined, on the under sides of the abdomen will be seen six little flaps, not unlike pockets, the covers of which can be easily raised with a pin or needle. Under these flaps is secreted the wax, which is produced in tiny scales or plates, and may be seen projecting from the flaps like little semilunar white lines. Plenty of food, quiet and warmth are necessary for the production of wax, and as it is secreted very slowly, it is so valuable that the greatest economy is needed in its use. It is indeed a wonderful substance; soft enough, when warm, to be kneaded and to be spread like mortar, and hard enough, when cold, to bear the weight of brood and honey. Moreover, it is of a structure so close that the honey cannot soak through the delicate walls of the cells, as would soon be the case if the comb were made of woody fibre, like that of the hornet or wasp.

Indeed, it is a most remarkable fact that the bee should be able to produce not only the honey, but the material with which is formed the treasury wherein the honey is stored. Honey itself is again scarcely less remarkable than wax.

The bee goes to certain flowers, inserts

its hair-clad proboscis into their recesses, sweeps out the sweet juice, passes the laden proboscis through its jaws, scrapes off the liquid, and swallows it. The juice then passes into a little receptacle just within the abdomen, called the "honey-bag," which is apparently composed of an exceedingly delicate membrane, and seems to discharge no other office than that of a vessel in which the juice or nectar can be kept while the bee is at work.

As soon as the honey-bag is filled, the bee flies back to the hive and disgorges the juice into one of the cells. All the food that is eaten by the bee passes through the honey-bag, which is closely analogous to the crop of a bird, and it would seem that the honey ought rather to pass into the stomach than be disgorged at the will of the insect. But the bee is enabled to perform this operation by means of a little valve which leads from the honey-bag into the stomach, and is plainly perceptible even with the unassisted eye. Under ordinary circumstances the valve just permits the food to pass gently and gradually into the stomach; but the violent effort which is made in ejecting the food closes the valve, and only allows the honey to flow upward through the mouth.

The office of the worker and drone-cells is two-fold—first, to act as nurseries for the insects while passing through their preliminary stages, and, next, to serve as repositories for food, whether liquid or solid. The egg of the queen-bee is placed nearly at the bottom of the cell, exactly on the angle where the points of the lozenges meet. It is soon hatched into a little white grub, which is assiduously fed by the nurses, and grows with wonderful rapidity. As soon as it has eaten its last larvæ meal, it spins a silken cover within the cell, and remains there till it has become a perfect insect. It then bites its way out, and after six or seven days devoted to hardening and strengthening its limbs in nursing the young brood, repairing the combs, &c., it issues from the hive and joins in the out-door labors of the older members of the community.

THAT bees can remember agreeable sensations at least is evident from the following anecdote related by Huber:

"One autumn some honey was placed on a window; the bees attended it in crowds. The honey was taken away, and the window closed with a shutter all the winter. In the spring, when it was re-opened, the bees returned, though no fresh honey had been placed there."

FROM the earliest times the little citizens of the hive have had the character of being an irritable race. Their anger is without bounds, says Virgil, and if they are molested, this character is no exaggeration. Some individuals, however, they will suffer to go near their hives, and do almost anything with them, and there are others to whom they seem to take such an antipathy, that they will attack them unprovoked. A great deal, perhaps, depends on this—whether anything has happened to put them out of humor.

For the American Bee Journal.

Frame Hives vs. Box Hives.

"I wish to manage my bees as they did a century ago, or, in other words, let them manage themselves; and when the season is over, take them up. Now, which class of hives would you advise me to use—the box-hive or the frame-hive?"

My advice to every bee-keeper is, use the frame-hives by all means. They can be made almost as cheaply as box-hives, the only difference in cost being the expense of a set of frames. A set of ten can be had, ready made, for fifty cents. Swarms can be put into frame-hives with as little trouble as into the other class, and they will work just as industriously, and store as much honey at least.

When you wish to "take them up," you will save at least fifty cents in time and trouble. There will be no cutting of combs, and consequently no waste of honey. In the central part of the hive you may find two or three frames, last used for brood, filled with valuable comb, in which is considerable bee-bread, and but a small quantity of honey. These combs are of little worth to the bee-keeper; but if saved till another year, and then given to new swarms, they will add much to their prosperity. A frame of empty comb is richly worth 25 cents, or a set of ten, \$2.50. All the comb, therefore, saved in the way indicated, is clear gain, and so much in favor of frame-hives.

Now, it seems to me that any person, whether a keeper of bees or not, can see the truth as pointed out, and will be forced to the conclusion, however unpalatable, that the frame hive is the better class for all bee-keepers to use. There are many arguments that might be used in support of this proposition; but let what has been said suffice for the present.

M. M. BALDRIDGE.

ST. CHARLES, KANE CO., ILL.

THE combs of bees are always placed by them at a uniform distance from each other, somewhat more than one-third of an inch, which is just wide enough to allow them to pass easily, and have access to the young brood. On one occasion, in consequence of Huber's arrangements in the interior of a hive, the bees began to build a comb near to the adjoining one than the usual interval, but they soon appeared to perceive their error, and corrected it by giving to the comb a gradual curvature, so as to resume the ordinary distance.

BEES are extremely neat in their persons and habitations, and remove all nuisances with great assiduity, at least as far as their powers enable them. Sometimes slugs or snails will creep into a hive, which, with all their address, they cannot readily remove. But here their instinct is at no loss; for they kill them, and afterwards embalm them with propolis, so as to prevent any offensive odors from incommoding them.

THE AMERICAN BEE JOURNAL AND GAZETTE.

WASHINGTON, FEBRUARY, 1867.

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Honey from Old Combs.

Mr. Mehring, of Bavaria, known as the inventor of the stamps for impressing honey-comb foundations, announces in a late number of the *Bienenzeitung*, that after a long series of experiments he has succeeded in devising a simple apparatus for extracting or separating honey from old, discolored, and black combs, with ease and despatch, so as to be entirely free from bee-bread and other impurities. He says that by means of his apparatus and process no "second quality" of honey is produced, but the whole perfectly resembles "virgin honey," and is fully equal to any obtained from new combs. No heated chamber, or any special arrangement of stove or hearth, is required. The operation can be successfully performed at any season of the year, in any room free from frost. The combs, being old and of no further value except for wax, are expeditiously cut in small pieces; and though candied honey requires somewhat more time for extraction, it presents no other material difficulty. The bee-bread remaining after the removal of the honey can be preserved and used as a valuable spring-food for bees.

The apparatus consists of three parts, costing about two francs in specie. To prevent defective or erroneous construction, Mr. Mehring, for the present, makes the apparatus himself, and furnishes it for the price stated, accompanied by detailed instructions for using it. For these instructions a separate fee is charged, the amount of which is not mentioned.

There is no reason that we are aware of for questioning the truth of Mr. Mehring's statement; and if his invention and process really accomplish what is alleged, another great and highly important advance in apiculture has been achieved.

A STRONG swarm, put in an empty hive at the swarming season, will sometimes, if the weather be favorable, construct a comb twenty inches long by seven or eight inches wide, in twenty-four hours.

THE letter of the Rev. George Kleine, the eminent apiarian at Lüethorst, near Hanover, and editor of the "*Bienenwirtschaftliches Centralblatt*" of that kingdom, which has been furnished to us for insertion, was addressed to the foreign editor of the BEE GAZETTE, whose assistance we hope to have in the "Foreign Department" of the AMERICAN BEE JOURNAL AND GAZETTE.

[THE following article, marked for insertion in the October number of the BEE JOURNAL, was inadvertently misplaced at the time. We insert it now, as an interesting item. Nothing of the kind was observed here, nor have heard that aught similar was noticed in any other quarter.]

For the American Bee Journal.

Disease of Bees.

Have you seen anything of a strange disease that prevailed among the bees in this section last month? Towards evening, say from four to five o'clock, the bees could be seen carrying out hundreds of living and apparently healthy workers, but, upon examining them, they would be found to have a number of golden-colored vesicles attached to their legs, about the thirty-second of an inch in length, sometimes three growing out of a common stem, sometimes two, and often singly. They would sometimes commence just behind the claw on the leg, and project beyond it, preventing, I should think, the bee from clinging to the combs. I have heard the loss to some stocks estimated at thousands of bees in a few days. The Italian and the native stocks seemed equally affected.

C. W. T.

HULMEVILLE, PA., Sept. 11, 1866.

Care of Empty Combs.

To protect empty honey-combs from destruction by the wax-moth or miller, suspend them singly in a dry airy chamber, or, if in frames, insert them occasionally for a few days in the hive of a strong colony, or keep them in an air-tight box, and fumigate them once in three weeks with brimstone.

IN Mungo Park's last mission to Africa, he was much annoyed by the attack of bees, probably of the same tribe with our hive-bee. His people, in search of honey, disturbed a large colony of them. The bees sallied forth by myriads, and attacking men and beasts indiscriminately, put them all to rout. One horse and six asses were either killed or missing in consequence of their attack, and for half an hour the bees seemed to have completely put an end to his journey. On another occasion he lost one of his asses, and one of his men was almost killed by the bees.

Pruning Stocks.

Spring pruning is injudicious and inexpedient in sections of country where early bee-pasturage regularly abounds, or where honey-yielding crops, such as rape, for instance, are annually cultivated. There honey is usually so plentiful at that season, that the great want of the bees is a supply of empty cells in which to store up their gatherings. It would hence be much wiser and better to aid them by inserting old combs, were it in our power to furnish them, rather than to increase their difficulties and embarrassments by pruning off and removing any portion of those which the hives contain.

But the case is bravely altered in districts where the supplies of pasturage, though early and ample, become available only very gradually, in orderly succession, and where the principal honey-harvest does not occur till June or July, or possibly not till August or September. There spring pruning is proper and in place, and may be unhesitatingly recommended and employed.

Ample proof of the correctness of this and of the resulting advantage can be furnished from various sections of country, almost every year. But the reason why it is beneficial in such sections is not that commonly assigned for it—namely, that the precocious development of a colony, and consequently premature swarming, are thereby prevented. The effect is the very reverse of this. If we desire that a colony should husband its resources in the spring, and maintain a sure but gradually progressive development, it should remain undisturbed and unexcited as long as possible.

Pruning a colony will as certainly stimulate it to activity, as pruning a tree will rouse its dormant powers, and incite to renewed growth. In certain circumstances, swarming may indeed thus be delayed or entirely prevented; but not because the colony did not become populous in season, for it is well-known that populousness is not the sole cause or the sole condition of swarming. Not unfrequently do we find a swarm issue unexpectedly from a weak stock, while from another twice as strong none whatever issues. If a pruned colony yield a swarm, while an unpruned one does not, it is because, in the latter case, a different direction was given to the activity of the bees. A pruned colony builds comb primarily from the exigency of the case, and continues doing so subsequently simply from habit, and if full play be given to this comb-building impulse, the bees, whatever their number, will remain a united body, never separating into distinct swarms, unless the state of the weather urgently impel them to divide. Moderate pruning will certainly not prevent or delay swarming. We all know how very rapidly a young swarm will build when placed in an empty hive where all has to be started from the very foundation, and what masses of combs it can show in the course of two or three weeks. And if in such case the queen is enabled to display her fertility in its fullest extent, is it likely that in a moderately pruned hive as many new cells could not be built, nor as many old ones emptied, as the queen would be able to supply

with eggs? I maintain confidently that a moderately pruned hive will speedily contain more brood than an unpruned one, because the increased activity of the workers will superinduce increased activity on the part of the queen also, and brood will speedily be extended to a greater number of combs; and because the queen can more easily and more rapidly deposit eggs in half-finished cells than in such as are of full depth. But whether the colony will yield an increased product is doubtful, and depends mainly on the fact whether or not pasturage continues to be abundant. If, subsequently, there be nothing for the bees to gather, the hive will naturally contain the more empty cells and comb, the more of them were filled with brood at the period of full pasturage. The more populous colony will also consume more of the garnered stores, and thus be the poorer as winter approaches. The injury resulting from pruning will besides be the greater the more drone-cells have been built, in consequence of the carelessness or inattention of the bee-keeper, who might easily have prevented the construction of such cells by seasonably inserting strips of worker comb as guides.

If non-pruning prove to be useful in certain districts peculiarly situated, where, for instance, summer immediately succeeds winter, it is simply because when this sudden opening of full pasturage occurs, the bees find themselves in possession of large numbers of empty cells to receive their gatherings, by the rapid filling of which they, to a certain extent, circumscribe the production of brood; whereas, if brooding were circumscribed or limited by the operation of pruning, and the growth and development of the colony thus restrained, pruning would, under all circumstances, be disadvantageous and to be discountenanced—in districts having early spring pasturage only, because the receptacles for honey would thereby be removed at precisely the time when needed; and in districts with late pasturage, because there would then be fewer laborers when large numbers would be essentially important.

And what intelligent bee-keeper would desire to retard the development of his stocks? On the contrary, he will strive by all proper means, even by the use of stimulating food, to hasten their development, when the probability is that a season of abundant pasturage is approaching. The increase must be gradually progressive, and the greater the number of stocks, and the larger the number of workers at midsummer, when pasturage is usually most abundant, the greater the harvest, and the most ample the surplus. Every interruption of brooding in the spring, whether from want of supplies or from change of queen, will be felt later in diminished productiveness. But, in districts having late pasturage, spring pruning is not attended by such disadvantageous consequences. It can, therefore, there not possibly retard the development of the colonies, but will, on the contrary, promote it.

DZIERZON.

THE Turks have some odd sayings. Among them is this—"You'll not sweeten your mouth by saying 'Honey!'"

LUTHORST, Oct. 31, 1866.

Prof. Birkenstock:

DEAR SIR: I had already, in the course of last summer, heard of the existence of your BEE GAZETTE, but only obtained sight of it through your special kindness, for which I heartily thank you. A perusal of the first three numbers satisfied me that your undertaking starts with broad practical views, and will doubtless be prosecuted with gratifying results. It was certainly a happy thought to devote special attention, in the "Foreign Department" of your paper, to what has been accomplished in the Old World in apistical science, since it cannot be denied that here, in the field of practical bee-culture, much has been achieved, a knowledge of which must be highly advantageous to the bee-keepers of the New World. That you especially have taken charge of this portion of the work, appears to me to give assurance that it will be executed with skill and success. As the name of *Birkenstock* is already favorably known in German apisticks, so, I am firmly persuaded, it will through you obtain similar estimation in this regard in the New World. Your BEE GAZETTE cannot fail to exert an influence for the advancement of bee-culture in North America, like that which the *Eichstädt Bienenzeitung* exerted, and still exerts, in Germany. I do not doubt that North American bee-keepers will soon turn to it with the same eagerness with which, according to the humorous sketch of your German correspondent, our bee-keepers here turn to the *Eichstädt Bienenzeitung*.

I anticipate also the approach of the time when we Germans shall turn to your GAZETTE to learn in what respects the American apiarians are surpassing us. We confidently look forward to the time when we shall be enabled to appropriate much of a practical nature from the experiments of your countrymen, while, we trust, on the other hand, to be able still, in future, to place in the scale our advances in theoretical science, and thus maintain an equipose.

Your correspondent also extols the merits of the German clergy in bee-culture. Well, I shall by no means question their claims, yet it would be invidious not candidly to recognize those of others likewise. There are brilliant names which present themselves on every side, a few of which, as they recur to me, permit me to recount, viz: Dr. Alefeld, Dr. Barth, Baron of Berlepsch, Baron Bose, President Busch, Dr. Dönhoff, Baron Ehrenfels, Mr. Gundelach, Mr. Herwig, Dr. Hofmann, Dr. Hübel, Dr. Jähne, Commissary Kaden, Mr. Knauff, Dr. Küchenmeister, Prof. Leuckart, Mr. Mehling, P. of Menzel, Prof. Ratzeburg, Commissary Riem, Mr. Ramdohr, Prof. von Siebold, Director Stöhr, Count Stosch, Prof. Treviranus, Prof. Zenker, and many more, who have displayed distinguished merit in scientific and practical bee-culture.

The most influential and important journal of bee-culture is, for us, unquestionably, the *Eichstädt Bienenzeitung*, which has been in efficient operation for more than twenty-two years. Of its importance you may judge from the fact that, in the year 1861, it became necessary to publish

a new edition, in the preparation of which I was united with the editor, Andrew Schmid. I conceive that I may properly recommend to you this new, revised, and systematically arranged edition, presenting as it does the Dzierzon theory and practice of bee culture from its origin to its ultimate triumph. The work was published at Nördlingen, in two large octavo volumes. It is peculiarly adapted to your purpose, and may be regarded as the repository of all German attainments in theoretical and practical bee-culture to the year 1862.

In later years, the *Bienenzeitung* has had to encounter the competition of numerous rivals. This is readily accounted for from the increased and still growing interest felt in bee-culture, which it is nevertheless not calculated to benefit, as it tends to fritter away energies which require to be concentrated to become efficient in securing progress. For this reason I desire that your BEE GAZETTE may long escape such rivalry.

You complain that much of the contents of German treatises on bee-culture is, for you, practically unavailable, because it is, in part, of local application, and in part controversial. The former is natural and incidental, and the latter unavoidable. How could we, without controversy, have achieved victories? We had, and still have, to assail antiquated and erroneous notions; and that cannot be done without eliciting strife. But hence, too, we may boast that we have thoroughly rid ourselves of much useless trash. But how readily error may creep in, and thus obtain seeming sanction, I can perceive even from your GAZETTE. Thus you have adopted this from Dr. Asmus: "Our honey-bee originated as it seems, and is now generally accepted, in Syria, or at least in some more suitable climate than that of Europe." (*Bee Gazette*, page 41.) Yet we are still altogether in the dark as its original country. Though it must unquestionably be sought for on the Old Continent, it must still be deemed a vain concert to assume for it a definite locality, or to assign it to a particular country. Just as it is impossible to say with certainty where any of our domestic animals originated, or whence their distribution proceeded, so also we do not find anywhere an original type of the honey-bee from which its native country might be inferred. To assume, in the present state of our knowledge, that Syria was its original home, is purely ridiculous. Again, it is stated, in the same place: "In the year 1843, the Italian bee was introduced into Germany by Captain Balenstein." Whereas the truth is that Captain Balenstein never brought Italian bees to Germany, much less in 1843. Undoubtedly some suggestions made by him in the *Bienenzeitung* of 1851 first impressed Dzierzon with the importance of the Italian bee in elucidating and solving various controverted theoretical points, and induced him to procure a colony from Italy; and thus the Italian bee was really first introduced into Germany by Dzierzon.

I might call your attention to much besides, but do not by any means design thereby to undervalue your publication. I would simply show how very easily occasion may be given

for controversy. Yet, if the controversy be concerning aught in itself important or valuable, and be maintained with equal vigor and in a becoming manner, we may always congratulate the paper which entertains it. The period during which an animated discussion was carried on in the *Bienenzeitung*, respecting parthenogenesis and other theoretical topics—the period, namely, from 1848 to 1858—was unquestionably the most brilliant part of its career. A similar period, with a similar controversy, I might well invoke for your GAZETTE.

That you have in your "Foreign Department" alluded favorably to my apistical labors, I duly appreciate, and shall not fail to acknowledge on all proper occasions, by transmitting articles to you.

For the present I send the last number of the *Centralblatt*, and will duly forward the succeeding numbers.

For your obliging care of the bee-hive of one of your correspondents in — I am thankful, though it has not yet come to hand. I had the pleasure, last summer, to receive from the Rev. L. L. Langstroth one of his hives and his treatise on the "Hive and Honey-Bee."

Should I be able in any way to manifest my readiness to serve you, you can unhesitatingly command me.

I remain, with the highest esteem,

Yours, &c.,

GEORGE KLEINE.

POPULOUS swarms inhabiting hives formed of the hollow trunks of trees, used in many northern regions, or of other materials that are bad conductors of heat, seem able to generate and keep up a temperature sufficient to counteract the intensest cold to which they are ordinarily exposed. At the same time, however, we may infer that though bees are not strictly torpid in winter at that lowest degree of heat which they can sustain, yet that when exposed to that degree they consume considerably less food than at a higher temperature, and that, consequently, the plan of placing hives in a north aspect in sunny and mild winters, may be adopted by the apiarian with advantage.

MANY means have been resorted to for the dispersion of mobs and the allaying of popular tumults. In St. Petersburg, a fire-engine playing upon them does not always cool their enolery; but were a few hives of bees thus employed, their discomfiture would be certain. The experiment has been tried. Lessier tells us that in 1525, during the confusion occasioned by a time of war, a mob of peasants assembling at Hohnstein, in Thuringia, attempted to pillage the house of the minister of Elende, who, having in vain employed all his eloquence to dissuade them from their design, ordered his domestics to fetch his bee-hives and throw them in the middle of this furious mob. The effect was what might be expected; they were immediately put to flight, and happy if they escaped unscathed.

[From the (London) Journal of Horticulture.]

Regicidal Attacks by Bees.

In the hope of assisting in the investigation of what still appears to me a most extraordinary and most unsatisfactory chapter in the natural history of our little favorites, I purpose stating briefly the conclusions at which I have myself arrived; pointing out, at the same time, in what respects my views coincide with or differ from those propounded by others.

Regicidal attacks by bees may, I think, be divided into three classes:

1st. Those in which a matron is imprisoned by her own children.

2d. Those wherein the regicidal frenzy is set on foot through the introduction of stranger bees by the apiarian.

3d. Those in which a juvenile monarch is attacked by her worker sisters, before she commences egg-laying.

Instances of the first class, in which a matron is assailed by her own children, seem to be comparatively rare, nor do they often come under the direct observation of the apiarian. When they do occur, however, they appear to be inevitably fatal. A queen may possibly survive several initiatory attacks, but these are repeated at uncertain intervals, until at last she succumbs. In such cases, and in such only, can I endorse the suggestion that a queen, once imprisoned, forfeits all regard from her subjects, and that, therefore, interference on the part of the apiarian can scarcely lead to any good result.

Cases of the second class, in which the regicidal frenzy is set up by the introduction of stranger bees through the manipulations of the apiarian, are, of course, equally rare in well-managed apiaries. But when such instances do arise, experience justifies me in declaring that the best results may be hoped for from prompt and judicious intervention*; since, if the hapless queen can but be kept alive in a queen-cage within the hive itself, until the regicidal mania has abated, she will be received by her whilom rebellious subjects, and no matter how furious the attack may have been, she will be no more liable to a repetition of it than if it had never occurred.

Although the third class, in which young queens are imprisoned before they have entered upon the duties of oviposition, appears to have been rarely observed by bee-keepers, it is in reality by far the most common form of regicidal attack among bees, and is, moreover, very frequently fatal. In these cases also I have found, by experience, that intervention on the part of the apiarian may often be beneficially resorted to, whenever the danger is perceived in time. Although the attack may be repeated more than once, it is not even then necessarily attended with a fatal result; and if by the assistance of the apiarian, or by her own unaided tenacity of life, the juvenile but distressed monarch can

*In introducing a queen, a number of her companions may be previously dismissed, but the final release should only be ventured upon within doors, where the queen may be readily recaptured in the event of her taking wing.

only last out till she begins egg-laying; her subjects thenceforward appear as heartily loyal as if she had never been incarcerated.

In conclusion, I may observe that while some declare themselves unable to endorse my opinion that the imprisonment of a young queen by her worker sisters can be characterized as a regicidal attack, they totally ignore the fact that I have supported this opinion by relating three several instances which came under my own observation, and in which the incarceration of such queens by their workers has been attended by fatal results. According to their views, our verdict in all these cases should, of course, be: "Killed by kindness." But from this conclusion I, for one, must entirely dissent, and would record my unhesitating conviction, founded on considerable experience and many opportunities of judging, that in all cases, and under all circumstances, whenever a queen, either old or young, is imprisoned by workers, her life is invariably in great jeopardy, and that no such thing ever occurs amongst bees as what may be termed the "friendly arrest" of a queen.—
A DEVONSHIRE BEE-KEEPER.

MUCH abuse has, from the earliest times, been lavished on the drones, and their indolence and gluttony have become proverbial. Indeed, at first sight, it seems extraordinary that seven or eight hundred individuals should be supported at the public expense, and to common appearance do nothing all the while, that may be thought to earn a living. But the more we look into nature, the more we discover the truth of that common maxim—that nothing is made in vain. Creative Wisdom cannot be caught at fault. Therefore, where we do not at present perceive the reason of things, instead of cavilling at what we do not understand, we ought to adore in silence, and wait patiently till the veil is removed, which, in any particular instance, conceals the final cause from our sight. The mysteries of nature are gradually opened to us, one truth making way for the discovery of another; but still there will always be in nature, as well as in revelation, even in those things that fall under our daily observation, mysteries to exercise our faith and humility, so that we may always reply to the caviller: "Thine own things, and those that are grown up with thee, hast thou not known; how then shall thy vessel comprehend the way of the Highest?"

REAUMUR observes that in a hive, the population of which amounts to 18,000, the number that enter the hive in a minute is a hundred; which, allowing fourteen hours in the day for their labor, makes 84,000. Thus every individual must make four excursions daily, and some five. In hives where the population was smaller, the numbers that entered were comparatively greater, so as to give six excursions or more to each bee. But in this calculation Reaumur does not take into account those that are employed within the hive in building combs or feeding the young, which must render the excursions of each bee still more numerous.

Artificial Queenraising.

The first in England to test the practicability of raising queen-bees from worker larvæ or eggs was Bonner, the well-known British apiarian. It appears, however, to have been tried by him merely to gratify his curiosity, for we do not find that he applied the process to practical uses in his apiary. Thenceforward, till about the time of the publication of Kirby & Spence's *Introduction to Entomology*, it is scarcely more than casually alluded to in any English work on bee-culture. Kirby & Spence furnish a somewhat detailed, though defective and partially erroneous historical account of it, without claiming to have any personal knowledge of what they call "this miracle of nature," and merely giving, in their first edition, the observation and conjectural inference of Mr. Payne, of Shipdam, in Norfolk, in confirmation of the "extraordinary fact."

Subsequently, in a later edition of their work, they insert in a note the following extract from Mr. Payne's diary, which, so far as is now known, entitles that gentleman to rank next to "Old Bonner," in England, in experimentally verifying "this most extraordinary circumstance in the natural history of the bee." The extract from the diary is as follows:

"July 10, 1820. A late second-swarm was hived into a box constructed so that each comb could be taken out and examined separately. On the 7th of August the queen was removed, and each comb taken out and closely examined. There was not the least appearance of any royal cells, but much brood and eggs in the common ones. On the 14th, three cells were observed, nearly finished, with a large grub in each. On the 18th and 21st they remained in the same state. On the 22d, two queens were found hatched; one was removed, and the other left with the stock, the remaining royal cell being still closed. On the morning of the 23d, a dead queen was thrown out of the hive; upon which examination being made, the royal cell left closed on the 22d was found open, and a living queen in the stock, which was allowed to remain."

SIXTEEN days is the time assigned to a queen for her existence in her preparatory states, before she is ready to emerge from her cell. Three days she remains in the egg; when hatched, she continues feeding, as a larvæ, five days more; when covered in, in the royal cell, she begins to spin her cocoon, which occupies another day; as though exhausted by this labor, she now remains perfectly still for two days and sixteen hours; and then assumes the pupæ, in which state she remains exactly four days and eight hours—making in all the period just named above. This is on the assumption of ordinary summer temperature. Colder weather will somewhat protract the period; and a higher temperature may hasten it slightly. The workers require four days more to bring them to maturity, and the drones eight days—the former remaining twenty days in their preparatory state, and the latter twenty-four.

[From the (London) Journal of Horticulture.]

Dropsy in Bees.

When "*A Devonshire Bee-keeper*" first hinted that he had experienced a new disease amongst his bees, I must confess I was a little perplexed, thinking and hoping that he was mistaken, and that it would turn out little more than an advanced stage of what was already known as dysentery. When, however, he explained its nature, it flashed across me that I had had a similar case in the preceding year in a weak colony, and in which all succumbed to the disease save the queen, which I gave to another hive; but in a few days afterwards found her abandoning the hive in a weak state and much swollen.

This case was allowed at the time to pass uninvestigated, and now I regret to say that another instance came under my observation only a few days since, in which I have to add to my obituary the loss of another queen from dropsy. The hive in which it took place was at the time in good condition in every respect, but quite dry, well ventilated, and well stored, and to all appearance a perfectly healthy stock, although it had sometime previously been breeding drones and workers successively. I happened to be taking a cursory glance at my hives, when seeing something unusually large on the alighting-board, I stepped forward and found it to be the queen in a weak state and much swollen. I took her in my hand, and tried to resuscitate her, but in vain. I next endeavored by gentle pressure to expel the accumulated water, but she did not survive the operation. In this instance the queen and one worker are as yet the only victims. I may now say with certainty that the misfortunes which have befallen the apiary of "*A Devonshire Bee-keeper*" have made themselves no less conspicuous in that of—*A LANCASHIRE BEE-KEEPER*.

THE wars of bees are not confined to single combats. General actions now and then take place between two swarms. Reaumur witnessed one that lasted a whole afternoon, in which many victims fell. In this case the battle is still between individuals, who at one time decide the business within the hive, and at another at some distance without. In the former case the victorious bee flies away, bearing her victim under her body between her legs, sometimes taking a longer and sometimes a shorter flight before she deposits it on the ground. She then takes her repose for a brief while near the dead body, standing on her four anterior legs, and rubbing the two hinder ones against each other. If the battle is not concluded within the hive, the enemy is carried to a little distance and then dispatched.

BEEs, when laden and returning to their nest, fly in a direct line, which saves both time and labor. How they are enabled to do this, with such certainty as to make for their own abode without deviation, has never been satisfactorily explained.

Stinging Insects.

Besides the insects which seek to make us their food, there are others which, although we are apt to regard them with the greatest horror, do not attack us with this view, but usually to revenge some injury which they have received or apprehend from us. Foremost in the list of these are those with four wings, which, according to the observation of Pliny, carry their weapon, an instrument of revenge, in their tail. These all belong to the Linnean order *Hymenoptera*; and the tremendous arms with which they annoy us, are two darts finer than a hair, furnished on their outer side with several barbs not visible to the naked eye, and each moving in the groove of a strong and often curved sheath, frequently mistaken for the sting, which, when the darts enter the flesh, usually injects a drop of subtle venom, furnished from a peculiar vessel in which it is secreted, into the wound, occasioning, especially if the darts be not extracted, a considerable tumor, accompanied by very acute pain. Many insects are thus armed and have this power. But those which principally attract our notice by exciting our fears are the hive-bee, the wasp, and the hornet. The first of these, the bee, sometimes manifests an antipathy to particular individuals, whom it attacks and wounds without provocation. The effect produced by the sting of these insects is different in different persons. To some they occasion only very slight inconvenience or a momentary pain; others feel the smart of the wounds which they inflict for several days, and are thrown into fever by them; and to some they have even proved fatal. Yet they are certainly, in general, but a trifling evil. They become, however, especially *wasps*, a very serious one to many, from the dread of being stung by them. An insect of a tribe never before suspected of being endowed with such a mode of annoyance, one of the order of *Lepidoptera*, found at the Cape of Good Hope, is said to defend itself, when captured, by stinging, whence it is there named the *Bee-moth*, and it is added that the puncture, which is very painful, is speedily followed by swelling and inflammation. —*Kirby and Spence*.

REAUMUR made a calculation, based on observations, of the quantity of bee-bread that may be collected in one day, by a hive containing from 18,000 to 20,000 bees. He found, supposing only half the number to collect it, that it would amount to more than a pound; so that, in one season, one such hive might collect more than a hundred pounds.

THE degree of heat in a hive in winter is great. A thermometer, near one, in the open air to stood in January at 7° F. below the freezing point; upon the insertion of the bulb a little way into the hive rose to 23° above it; and could it have been placed between the combs, where the bees themselves were clustered, it is probable the mercury would have risen as high as it does abroad in the warm days in summer

MONTHLY MANAGEMENT.

February.

The "bee-year" commonly commences in this month, as we have then the first indications and evidence of reviving activity in the hive. A small amount of brood is indeed not unfrequently found already in January, in strong stocks, when the weather is mild, Italian queens particularly being inclined to early, we might say premature, oviposition. This, however, is not a desirable condition of affairs, as such early brooding is always hazardous, and involves a large consumption of stores, which might be more usefully reserved till later in the spring. It is hence advisable to repress brooding, wherever practicable, till towards the middle of March, if we wish to be sure of having strong colonies when the gathering season opens.

Stocks wintered on their summer-stands should, therefore, remain undisturbed till after the bees have been able to fly and discharge their feces, and are carrying out their dead. This is the proper time, too, to change the bottom-boards, substituting new and clean ones therefor, or cleansing and drying the old ones. The dead bees found on the bottom-board of every hive should be carefully examined, to see whether the queen be among them; and if she be found there, the stock should either be broken up at once, or united with some weak colony having a fertile queen. The hive should now remain undisturbed, and requires no further attention, till a mild day occurs, enabling the bees to fly, when their deportment should be carefully observed, to see whether any of the stocks show signs of queenlessness. If any such are noticed, they should be disposed of as directed above, for it is much too early in the season to think of enabling them to rear a queen by supplying them with eggs and larvae, unless perchance a drone-breeding queen have been wintered in the apiary.

Stocks in movable comb-hives should also be examined on the first day when bees are able to fly, to ascertain the condition of their stores, and to supply such as are deficient; and the opportunity should likewise be used to look for the queen. End-combs containing honey may now also be set nearer the middle of the hive where the bees have been clustered, to render the stores more readily accessible to them, and to restrict the brooding space to narrower limits.

Colonies wintered in a dark chamber or cellar should not be replaced, or their summer-stands, till the winter is thoroughly broken; and a mild day, when the bees can fly, should be chosen for the removal. Stocks intended to be placed aside of each other on the stand, should not be brought out at the same time, as the one which makes the loudest humming will attract many bees from its neighbor, if the bees of both be flying at the same time, when set out. It is better to remove, first, such as can be set remote from each other. If before removal, and while the weather does not yet permit the

general transfer, any colony be found restless or heard humming loudly, it should be taken out separately and examined, to be fed if in need of stores, or otherwise disposed of, if queenless.

If stocks in movable comb-hives need supplies at this time, these can be most advantageously furnished by inserting frames containing honey in the comb. But if such frames are not at hand, rock-candy may be placed on the tops of the frames, the honey-board taken away, and its place supplied by a piece of thin blanket or strips of stout flannel. This will enable the bees to supply themselves as their wants require. Where rock candy cannot be obtained, sticks of common sugar candy may be pushed down among the bees, between the combs, and the honey-board then replaced, or a piece of blanket used as a substitute.

Where brooding commences early, the bees need large supplies of water, and many are lost from exposure to cold or wind, when leaving their hives to procure it. Damage from this cause can be prevented by pouring water in a piece of old comb, and inserting it in the hive, that the bees may help themselves without going abroad. Afterwards, when the weather becomes milder, and the bees can safely leave home, water should be placed for them in a shallow dish, in some sheltered nook near the apiary.

Cracks or crevices in common box-hives should be closed by means of mixture of clay and chaff, to prevent the escape of heat, and keep out marauders.

THE amputation of one of the antennæ of a queen-bee appears not to affect her perceptibly; but cutting off both these important organs produces a very striking derangement in all her proceedings. She seems in a species of delirium, and deprived of all her instincts. Everything is done at random, yet the respect and homage of the workers towards her, though they are received by her with indifference, continue undiminished. If another in the same condition be put in the hive, the bees do not appear to discover the difference, and treat them both alike. But if a perfect one be introduced, even though fertile, they seize her, keep her in confinement, and treat her very unhandsomely. If two mutilated queens meet, they show not the slightest symptoms of animosity. While one of these continues in the hive, the workers never think of choosing another; but if she leaves it, they do not accompany her.

It is a saying of bee-keepers in Holland that the first swallow and the first bee foretell each other. This, perhaps, may be correct there; but with us the appearance of bees considerably precedes that of the swallow; for when the early crocuses open, if the weather be warm, bees may always be found busy in the blossom.

WATER is a thing of the first necessity to bees; but they are not very delicate as to its quality, but rather the reverse, often preferring that which is stagnant and putrescent to that of a running stream.